Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

High Field Structural Transition of Vortex Lattice Observed in Single Crystals of $HgBa_2CuO_{4+\delta}$[1] JEONGSEOP A. LEE, INGRID STOLT, YIZHOU XIN, W. P. HALPERIN, Northwestern University, A. P. REYES, National High Magnetic Field Laboratory, M. K. CHAN, Los Alamos National Laboratory — Vortex dynamics in $HgBa_2CuO_{4+\delta}$ changes at a temperature $T_v(H)$ corresponding to the formation of a vortex lattice (VL) in a field H. Above this onset temperature, the spatial fluctuations of local magnetic fields due to vortex supercurrents are motionally averaged to zero. Below T_v the local field distribution is quasi-static. This change in the vortex timescale is marked by a small enhancement in the transverse relaxation rate and appearance of a characteristic NMR spectral lineshape due to the presence of VL. The T_v was measured using relaxation measurements for three samples, two underdoped with $T_c = 87$ and 79 K and one overdoped with $T_c = 78$ K. We present our results from ^{17}O NMR at the apical oxygen site as a function of external magnetic field up to 30 T. The vortex lineshape contribution can be separated from inhomogeneous broadening by deconvolution with the normal state spectra. We fit the spectra below T_v(H) to the field distribution of an idealized VL from Ginzburg-Landau theory to determine the VL symmetry, penetration depth, and coherence length and find evidence of a VL structural transition in high magnetic field.

[1]DOE BES Division of Materials Sciences and Engineering, DE-FG02-05ER46248 (Northwestern University); DOE BES grant LANLF100 (MKC); and support from the NHMFL, supported by the NSF grant DMR-1157490 and the State of Florida.

Jeongseop A. Lee
Northwestern Univ

Date submitted: 03 Jan 2017 Electronic form version 1.4